**UNITED STATES OF AMERICA**
**FEDERAL COMMUNICATIONS COMMISSION**
**WASHINGTON, D.C. 20554**

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| **Application Of An "Interference** | **)** | |
| **Temperature" Concept To The** | **)** | **FCC Docket No. 03-237** |
| **Radio Spectrum** | **)** | |

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# REPLY COMMENTS OF
# DON SCHELLHARDT, ESQUIRE

## ***TABLE OF CONTENTS***

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| | | |
|---|---|---|
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# REPLY COMMENTS OF DON SCHELLHARDT, ESQUIRE

**I am Don Schellhardt, Esquire. At present, I am a Government Relations attorney, in solo practice, and a writer.**

**My current clients include THE AMHERST ALLIANCE, a citizens' advocacy group for more open airwaves in general and Low Power Radio in particular, and the NATIONAL ANTENNA CONSORTIUM (NAC), which represents ham radio operators and other owners, users and/or builders of communications antennas.**

***In these Reply Comments, I speak only for myself.*** **My views do not necessarily reflect the outlook of any current client, previous client or past employer.**

## THE FOCUS OF THESE REPLY COMMENTS

**I hereby express agreement with the observations and recommendations of NICK LEGGETT N3NL, of Virginia, in his Written Comments of December 30, 2003. I also offer some related observations and recommendations of my own.**

## RELEVANT PERSONAL BACKGROUND AND EXPERIENCE

**I have spent nearly 3 decades working for, or attempting to influence from the outside, various arms of government. This work has involved all 3 branches of government -- Legislative, Executive, Judicial -- at both Federal and State levels.**

**For purposes of preparing these Reply Comments, I have drawn upon my experience with *communications legislation and regulation,* but I have also drawn upon my experience with *energy and environmental legislation and regulation.***

**The former body of experience includes a total of 5 years as leader of THE AMHERST ALLIANCE, as well as more limited experience with NAC and with CANYON AREA RESIDENTS FOR THE ENVIRONMENT (C.A.R.E.)**

**The latter body of experience includes:**

- **3 years as a Congressional aide, specializing in energy, the environment and national defense**
- **12 years as a Government Relations attorney with the American [Natural] Gas Association, including service as A.G.A.'s Director of Legislative and Regulatory Affairs**
- **1 year as a Policy Advisor at the U.S. Environmental Protection Agency**
- **1 year as an energy and environmental consultant, specializing in energy utilities, with clients including the U.S. EPA and 3 State Public Utility Commissions**

**The relevance of this energy and environmental policy experience will become obvious in the balance of these Reply Comments.**

## OBSERVATIONS AND RECOMMENDATIONS

**I second, heartily, the assertion by NICK LEGGETT that the Commission -- *before* it accepts significantly increased "spectrum congestion" as the only way to accommodate growing demand for spectrum by broadband users and other wireless users -- should *first* take the following steps:**

**(A) Attempt to quantify the projected growth in demand for spectrum by broadband/wireless users, in order to determine whether a major change in spectrum policy is *really* necessary**

***And***

**(B) *If* a major change in spectrum policy is indeed found to be necessary, consider "thinning the herd" of incoming broadband/wireless users, through some system of prioritization, rather than imposing a higher "noise floor" on everyone**

***And***

**(C) *If* an effort is made to apply the "interference temperature" and/or "intermittent operations" concepts in "the real world", begin with several "field tests" -- and assess the "real world" results *very* carefully -- before attempting any nationwide application of the concept(s)**

**Besides endorsing Nick's recommendations, I also want to add to them.**

**Specifically:**

**(D) I am proposing certain modifications, based on the "real world" experience of air quality management agencies and energy utilities, that should make the "interference temperature" and "intermittent options" concepts *somewhat* more workable**

***And***

**(E) I am proposing additional, less disruptive alternatives for making more spectrum available to new users**

## "Emission Offsets" As A Possible Role Model For The "Interference Temperature" Concept

**Radio Frequency Interference (RFI) is a kind of pollution. Like air pollution, its sources are both natural (volcanic eruptions, for example, and solar flares) and man-made (auto exhausts, for example, and television stations). In both cases, however, man-made pollution predominates most of the time.**

**A nationally known expert on RFI once told me this, in a private conversation:**

> **If you go to Antarctica and then go to Times Square, you will discover that resulting increase in air pollution is roughly proportional to the increase in light pollution and the increase in "noise" on the electromagnetic spectrum.**

**Because RFI is a form of pollution, it is instructive for the FCC to examine how the various Clean Air Act statutes, as implemented by the U.S. EPA, have approached the air quality equivalent of an "elevated noise floor". In various "non-attainment" areas, such as Los Angeles and New York, where one or more air pollutants have exceeded legally permissible levels -- and in certain other geographical areas where further degradation of air quality is not permitted -- legislators and air quality regulators have worked together to accommodate carefully targeted economic growth through "emission offsets".**

**In this regard, it has been said by some that current FCC regulations set a fixed ceiling on electromagnetic emissions *per transmitter,* whereas the contemplated "interference temperature" concept would set a variable ceiling on electromagnetic emissions *per receiver.* By contrast, the reasonably successful "emission offsets" concept sets ceilings on both emissions per "point source" (comparable to a ceiling on electromagnetic emissions per transmitter) *and* overall pollutant levels in the ambient air (comparable to a ceiling on electromagnetic emissions per receiver).**

**For example, all tailpipe emissions from motor vehicles in a "non-attainment" might be limited to X parts per million of pollutant Y, and all stationary facilities might be limited to Z parts per million of the same pollutant. The standards for mobile point sources are, in practice, broken down much further -- with separate and simultaneous standards for buses, trucks and cars, with variations by model year -- and so are the standards for stationary point sources, with oil refineries in a different category from shopping malls. The point is that each "point source" has a specified emissions limit.**

**At the same time, there are simultaneously applicable limits on the maximum permissible pollution in the ambient air for each air quality region. These standards, too, vary greatly -- in this case, from pollutant to pollutant. For example: An *extremely* toxic pollutant, such as mercury, is held to a much lower maximum than somewhat less dangerous pollutants, such as ozone or sulfur dioxide.**

**When even *one* of these pollutants is found to be present, at ambient air concentrations which exceed the legally permissible maximum, the area is classified as "non-attainment". The Los Angeles Basin is "out of attainment" for several pollutants, whereas the majority of "non-attainment" areas are "out of attainment" only in the case of low-level ozone (smog).**

**"Non-attainment" status brings certain consequences for an area, such as a potential loss of some or all Federal aid unless the local governments take certain suitable corrective steps.**

**Another consequence of "non-attainment" status is the triggering of "emission offset" requirements for new stationary point sources. (Mobile sources are treated differently, and more leniently, in the underlying statutes.)**

**The "emission offset" requirements apply to proposed new stationary point sources, inside the "non-attainment" area, which exceed a certain size and would add to levels of a pollutant that is already above the ambient air maximum.**

**Such proposed new emission sources -- which may be anything from paint factories to powerplants -- are allowed to commence operations *only* if they obtain "emission offsets" by reducing emissions from existing point sources.**

**In the Hampton Rhodes area of Virginia, for example, a proposed new oil refinery -- which was ultimately not built, but which did win the approval of air quality regulators -- obtained siting approval by offering to pay for re-paving all of Virginia's asphalt highways with concrete.**

**In this case, the avoided pollution from the asphalt --- a petroleum derivative, which emits pollutants through vapors rather than combustion -- would have exceeded the projected pollutants from the new oil refinery.**

**As another example, more than one new factory has been approved i Southern California by buying up laundries and then shutting them down, to be replaced by other retail operations. Relative to their size, laundries tend to be far more polluting than factories. Therefore, buying up and shutting down a few dozen of them has sometimes reduced enough existing air pollution to more than offset the projected new pollution from a newly built factory.**

**It is important to note, in these accounts, the key phrase *"more* than offset". Only in a minority of cases are 1-to-1 emission offsets permitted. In the substantial majority of cases, the emission offsets must be 1.1-to-1 or higher.**

**The idea is to keep the air pollution equivalent of a "noise floor" going *down,* rather than up -- even as new economic growth is accommodated.**

**This is a very important distinction from the current version of the FCC's "interference temperature" concept, which does *not* appear to envision a process of continuing decline in "noise" until such time as an optimal level is reached. The difference *may* be rooted in the fact that the Clean Air Act statutes envision existing point sources as "fair game" for emission reductions, while the FCC's concept appears to accept existing emissions as a "given".**

**In the world of air pollution, emission offsets are often achieved by targeting point sources which are inefficient, due to poor design, poor maintenance or simply aging. In Southern California, for example, there is an "emission offsets" market for "clunkers": that is, cars, more than 25 years old, which are "rambling wrecks" and far above the norm in their tailpipe emissions. Such cars are sometimes sold, at well above their usual market value, for the purpose of being taken off the road.**

**People who are more technologically knowledgeable than I have told me there are similar opportunities to reduce electromagnetic emissions, through the repair and/or replacement of inefficient electronic equipment. A simple example might be a company's offer to replace all of the street lights in a given city every 2 years, thereby avoiding radiated interference during their later years of life.**

**What is needed, right now, is the *motivation* for interested parties to invest in such reductions of electromagnetic emissions from existing electronic equipment. If access to the spectrum by larger-volume new users were made conditional upon the attainment of electromagnetic emission offsets, sufficient to outweigh the added RFI by a ratio of 1.1-to-1 or higher, there is every reason to believe this could constitute a *powerful* incentive. The *self*-interest of aspiring new spectrum users would then be harnessed to serve the *public* interest in a "noise floor" that is dropping rather than rising.**

## "Interruptible" Energy Utility Service As A Possible Analog To The "Intermittent Operations" Concept

**The concept of "intermittent operations" has been employed by energy utilities for decades.**

**However, in the world of electric and natural gas utilities, this concept is known as "interruptible" utility service, which is normally provided for a significantly lower rate than "firm" utility service. Certain utility customers knowingly choose to save money by accepting the tradeoff of being cut off when their electricity and/or natural gas supplies are needed elsewhere.**

**More often than not, these customers have their own backup energy supplies (usually, oil as a substitute for natural gas and on-site generators as a substitute for utility electricity).**

**It is also typical for service disruptions to be seasonal, and in that sense predictable. Most service interruptions occur in the winter in the case of natural gas, where peak demand is driven by heating loads, and in winter and/or summer in the case of electricity, where both heating and cooling loads can cause peaks in demand.**

**Service disruptions on the radio spectrum may differ from these patterns. For example, they may be less seasonal and therefore less predictable.**

**In recent decades, it has also become common for natural gas producers and independent power generators to have "interruptible" energy supply contracts with utility retailers and/or ultimate customers who purchase their energy directly. Such contracts allow the utilities and end users to cut off deliveries whenever they can find a lower price from another energy supplier -- or on the "spot market".**

**The FCC's concept of "intermittent operations" seems highly analogous to these existing arrangements in the natural gas and power generation industries.**

**For this reason, the FCC should be aware of the problems which have arisen from these arrangements in these industries:**

**(A) Where energy is purchased by utilities, brokers, or others, on behalf of end users, there is a continuing risk that the utility or other purchasing agent will not disclose to the end users the risks they are assuming in return for the lower rates they are receiving. This is a particularly great risk when the ultimate customers are individual households or small businesses, which typically lack a sophisticated understanding of the energy marketplace. As a result, natural gas and electric utilities, and interstate natural gas pipelines, are generally required to offer end users *a choice* between: (i) "firm" service rates, with higher rates in return for a guarantee of service reliability, and (ii) "interruptible" rates, with lower rates in return for service disruption risks. *These service disruption risks must generally be fully disclosed to the ultimate customers*.**

**(B) There is a continuing risk that some energy users will be insufficiently knowledgeable to give truly "informed consent" to "interruptible" service -- and/or should not be allowed to "gamble" because their operations are simply too vital to society as a whole. As a result, regulators have usually prohibited utilities and pipelines from offering "interruptible" service to schools, hospitals and similar energy users whose services have a high social value.**

**(Schools, hospitals and similar users can now "bypass" this restriction if they choose, by deciding to "bypass" the utility system -- through direct purchases of energy from the ultimate suppliers. In the event of service disruptions, however, they have only themselves, and *not* the regulators or the utilities, to blame.)**

**(C) The historically recent emergence of "spot market" natural gas and/or electricity contracts -- and of other contracts which the energy *purchaser,* rather than the energy supplier or energy retailer, can choose to interrupt -- has created the serious problem of inadequate capital investment in either *long term* natural gas supplies or *baseload* electric powerplants. Instead, with few if any guarantees of reliable markets for their energy production, natural gas producers have generally focused on short term supplies from shallow natural gas fields -- rather than larger, newer fields where the costs of drilling, and/or the risks of hitting "dry holes", are substantially higher. In the electric utility industry, for the same reason, modern power generation projects have generally taken the form of "peak load" powerplants that are relatively small and cheap to build -- but are more expensive on a life cycle basis, and also less reliable, than the more traditional powerplants that were built to handle base levels of electricity demand.**

**During the mid-1980's through the mid-1990's, when both natural gas and electricity supplies were generally in a surplus situation, "spot market" energy prices were generally below the norm. Therefore, the rush to "spot market" energy purchases, and short term supply projects, saved energy users some money in the short run.**

**Today, however, supplies of both natural gas and electricity have tightened, due in large part to *under*-investment in energy production as a result of insufficiently firm supply contracts. In *today's* environment, "spot market" energy prices are running well *above* the norm -- and the norm itself has risen substantially. Average natural gas prices, at the point of production, have risen from $2.50 to more than $5.00 per thousand cubic feet in only a few years -- and "spot market" electricity prices have risen as high as an incredible $700 per kilowatt, which is *dozens of times* the norm. Thus, "the chickens are coming home to roost" -- in the form of price surges that *more than wipe out* the short-sighted savings of a decade ago.**

**The relatively recent "rolling blackouts" in California have underscored the value of applying certain *traditional* principles to the regulation of energy utility service and pricing. Before it was swallowed up in an energy disaster of its own making, California -- cheered on by Pacific Gas & Electric, which later went bankrupt -- broke *all* the rules.**

**Instead of *preventing* utilities from purchasing "interruptible" energy supplies on behalf of schools, hospitals, homeowners and other vulnerable parties, and also mandating full disclosure of the risks of "interruptible" service to all of its eligible customers, the California Public Utilities Commission actually *required* utilities to purchase *only* "interruptible" energy supplies for *all* of their customers.**

**In the process, California proved yet again -- with a dramatic flair worthy of Hollywood -- that "cheap" can sometimes be very, very, *very* dear.**

**To prevent the FCC from making a mistake of similar magnitude, I strongly recommend the following modifications of the "intermittent operations" concept, *if* the Commission chooses to pursue the idea at all:**

**(D) Require those who acquire spectrum access on behalf of others to fully disclose the risks of "intermittent" service to these affected customers, *and* to give those customers the choice of "firm" service at a higher rate (with some of the premium for "firm" serviceperhaps being shared with the FCC)**

***And***

**(E) Prohibit completely the acquisition of "intermittent" spectrum access on behalf of police communications, fire department communications, Emergency Medical Team communications, hospital communications and and similar users whose uninterrupted services are of vital importance to society**

***And***

**(F) Recommend to the National Telecommunications and Information Administration (NTIA) the development of similar policies if the "intermittent operations" concept is applied to users of Federal frequencies**

***And***

**(G) Monitor the marketplace periodically to see whether the "intermittent" spectrum access policy may be causing dangerous levels of *under*-investment in communications capability**

## The Need For "Field Testing" -- And A Selective Registration System

**In light of the concerns expressed above, two corollary recommendations follow logically:**

**(A)** ***The Need For "Field Testing".*** **It is absolutely clear that NICK LEGGETT was "on target" when he called -- in his December 30, 2003 Written Comments -- for extensive "field testing" of any plans to apply the "interference temperature" and/or "intermittent operations" concepts in "the real world".**

**Even with the modifications I have proposed above, the risks of disaster are simply too high to warrant an immediate jump to application of either concept on a nationwide scale. Given the need to proceed with extreme caution, any national application of these concepts -- *if* such an application is undertaken at all -- should be preceded by *several* "field tests" in several different markets, with very careful assessment of the "real world" results after each "field test" has been made.**

**(B)** ***The Need For Selective Registration.*** **It is also clear that the proposed modifications -- which form, I believe, a *minimum* "safety net" -- will not work without some ability by the FCC to identify, and oversee, the new spectrum users.**

**To wit:**

**If the "interference temperature" concept is too much of a "blank check" to generate additional interference *unless* new spectrum users are required to make meaningful "emission offsets", then the Commission must know who those new spectrum users are *and* be able to monitor what kind of emission offsets they are making (or failing to make). Although I strongly recommend excluding from any offset requirements the many *de minimis* unlicensed users of spectrum, such as CBers and legal-but-unlicensed Part 15 radio stations, some form of offset requirements need to apply to the larger-volume new spectrum users.**

**While the Commission may well consider it advisable to keep larger-volume broadband/wireless users *unlicensed,* pursuant to the current version of Part 15, this does not mean that such larger-volume broadband/wireless users must also be *unregistered.* For purposes of applying *and enforcing* offset requirements, the FCC should require all new spectrum users above a certain volume to file with the Commission a declaration of their intent to engage in new operations, a declaration of their intent to obtain all necessary interference offsets *before* the onset of new operations and a list of all interference offsets to be attained (including a list of *recurring* offsets to be made to the extent that any of the initial offsets are temporary in effect).**

**Similarly, the proposed modifications of the "intermittent operations" concept also require that some spectrum users must be *registered,* even if the FCC does not require them to be *licensed.* Clearly, if certain spectrum uses are to be deemed too vital to opt for "intermittent operations", the Commission has to know who the proposed spectrum users are *and* what kind of uses they propose to make dependent upon spectrum access that is "intermittent".**

**Also: If spectrum users are to be held legally accountable for disclosing to their customers the risks of reliance on "intermittent operations", the FCC needs to have available, or at least be in a position to demand, proof that the required full disclosure has in fact been made to each and every affected customer. This is another reason why the FCC *must* be in a position to identify the "intermittent operators" *and* to review, if necessary, their contracts with their customers.**

## ONE Alternative:
## Spectrum Expansion RD&D

**Although the results would not be immediate, modest FCC grants for Research Development & Demonstration (RD&D) projects on spectrum expansion might, over time, create much more "room" for wireless services and other new communications technologies. Instead of jamming more uses into a comparatively fixed portion of the electromagnetic spectrum, more of the spectrum itself could be made available for use.**

**Promising technologies include the development of *infrared broadcasting* and *low power millimeter wave broadcasting.* A potential, though arguably more problematic, variation on this theme might be *long wave AM broadcasting.***

**By creating new "homes" for new spectrum uses, and/or "places" for some of the more established spectrum uses to migrate, these potential spectrum expansion technologies could reduce or eliminate the current level of "built-in" competition for spectrum access between traditional spectrum uses and those based upon newer technologies.**

***Virtually all of the current interest in infrared broadcasting, low power millimeter wave broadcasting and long wave AM broadcasting appears to be concentrated among individual inventors and/or very small enterprises.*** **This apparent "fact of life" constitutes an important opportunity for the FCC, since:**

**(A) Meaningful progress can probably be made very cost-effectively, by people who are used to making the most of lean budget;**

***And***

**(B) The emergence of new inventors and entrepreneurs will help to mitigate the currently excessive concentrations of ownership in the communications industries, and especially in the mass media.**

**In this regard, I personally endorse a recommendation which has already been made to the Federal Communications Commission by THE AMHERST ALLIANCE.**

**To wit:**

**The FCC should establish a special fund -- budgeted at $10,000,000 annually or less -- to provide grants to individual inventors and/or small enterprises. These grants should finance RD&D projects on infrared broadcasting, low power millimeter wave broadcasting, long wave AM broadcasting and/other promising spectrum expansion technologies. Each grant should range between $50,000 to $100,000 per project per year.**

**Since broadband technologies and other wireless technologies are driving the FCC's efforts to "stretch" the electromagnetic spectrum, for the sake of the new users, these corporate interests would be the most immediate beneficiaries of ways to expand the usable portions of that spectrum. Therefore, one option for financing the RD&D Fund could be a small FCC surcharge on the operations of these newer spectrum users.**

## ANOTHER Alternative:
## Different Digital Broadcasting

**As another alternative, the FCC could -- and should -- reconsider its current "interim" approval of In Band On Channel (IBOC) Digital Radio technology.**

**A Petition For Reconsideration of that decision, filed by THE AMHERST ALLIANCE and 41 other parties, has been pending in FCC Docket 99-325 since October 25, 2002. The Commission has neither granted nor denied this Petition For Reconsideration. Nor has the FCC responded to subsequent requests in FCC Docket 99-325 -- filed respectively by John Pavlica, P.E. of Ohio and Leonard Kahn, P.E. of New York's KAHN COMMUNICATIONS -- for suspension of IBOC authorization, pending a competitive comparison of IBOC with alternative technologies.**

**Although there are several reasons for challenging the Commission's *un-competitive* selection of IBOC as the only authorized Digital Radio technology, one of the reasons is the "In Band" nature of IBOC. Since IBOC technology keeps Digital Radio operations in the same portion of the electromagnetic spectrum that is also used by Analog Radio, IBOC forces an otherwise avoidable competition for spectrum between Digital Radio uses of the spectrum and Analog Radio uses of the spectrum. This avoidable competition is then intensified because, according to Christopher Maxwell of VIRGINIA CENTER FOR THE PUBLIC PRESS (VCPP), *IBOC technology requires a 50% expansion of bandwidth when a station shifts from Analog Radio to Digital Radio.* Mr. Maxwell can be reached at max@wrir.org or via the Web Site at www.digitaldisaster.org**

**IBOC's 50% expansion of bandwidth translates automatically into a 33% reduction in the bandwidth that is available for neighboring stations on the dial.**

***All of the Digital Radio alternatives to IBOC technology -- Digital Radio Mondiale, Eureka-147 and KAHN COMMUNICATIONS' new CAM-D technology, for AM Digital Radio broadcasts -- would avoid the 50% bandwidth expansion that IBOC technology requires.***

**Eureka-147, the most established technology among the Digital Radio technologies, would move Digital Radio operations into the "L" Band, thereby avoiding competition with Analog Radio completely. If Eureka-147 were adopted, in place of IBOC, large commercial and non-commercial radio stations could migrate to the "L" Band, which they would share with the U.S. military. Due to this additional "room", the current FM and AM Bands could, in time, be reserved completely for Low Power FM Radio, Low Power AM Radio, locally focused Class A and B commercial and non-commercial stations, special services (such as Amateur Radio and shortwave listening) *and* the newer wireless technologies (some of which would migrate *from* the "L" Band).**

**The Commission could instead selected Digital Radio Mondiale for both the FM and AM Bands -- or a combination of KAHN COMMUNICATIONS' new CAM-D technology for the AM Band, plus Digital Radio Mondiale or Analog Radio or IBOC for the FM Band. In those cases, there would still be less spectrum compression than the level we can now foresee with the scheduled shift to IBOC Digital Radio broadcasts on both the AM Band and the FM Band.**

**In short:**

**Replacing IBOC Digital Radio technology with a less disruptive technology -- *at least* on the AM Band, where the interference problems appear to be the worst -- would serve the same objective as application of the "interference temperature" and/or "intermittent operations" concepts. It would serve this objective, however, without posing the same "downside risks.**

## CONCLUSIONS

**For the reasons set forth herein:**

**1. I urge the Federal Communications Commission to proceed with extreme caution in developing the "interference temperature" concept and in applying it to the broadcast spectrum. To the extent that this concept is applied to "the real world" at all, it should incorporate the "emission offsets" concept from the world of environmental policy -- so that any increases in the radio spectrum's overall "noise floor" will be avoided or at least minimized.**

**2. I also urge the Federal Communications Commission to proceed with extreme caution in developing the "intermittent operations" concept and in applying it to the broadcast spectrum. If efforts are indeed made to apply the "intermittent operations" concept to "the real world", the Commission should first study and assess -- *carefully* -- the experience that electric and natural gas utilities, especially in California, have had with interruptible energy supply**

**contracts. Possible pitfalls should be identified and avoided -- and "safety nets" to protect the interests of the ultimate consumer should be developed and deployed.**

**In particular, the FCC should not allow any spectrum user to obtain "intermittent" spectrum access on behalf of customers without first making full disclosure of the risks to each and every potentially affected customer *and* offering each potentially affected customer the alternative of reliable spectrum access at a higher price. The Commission should also ban *any* "intermittent" service *at all* for certain spectrum uses which are particularly vital to the larger society.**

**3. I further urge the Federal Communications Commission to make certain that any and all efforts to apply the "interference temperature" and/or "intermittent operation" concepts to "the real world" are first "field tested" on a small scale, several times, before any experiment is extended to a national scale.**

**4. While the Commission may choose to let certain spectrum users remain *unlicensed,* under Part 15, it should not leave the larger-volume spectrum users *unregistered* -- if, that is, the FCC plans to apply the "interference temperature" concept and/or the "intermittent operations" concept in "the real world". Prudent application of the "interference temperature" concept requires offsets, at least by the larger-volume spectrum users, which in turn requires some kind of regulatory registration -- so that offsets can be identified, recorded, monitored and enforced. Safe application of the "intermittent operations" concept requires full disclosure of the risks to all potentially affected customers, as well as a complete exclusion from**

**the "intermittent" services option for those spectrum uses which are particularly vital to the larger society. Neither protection can be provided, monitored or enforced unless some kind of registration system has been put in place.**

**5. Further, I urge the Commission to pursue 2 alternative responses to the growth in demand for broadband services and other wireless services:**

**(A) Development of a special RD&D fund, providing annual grants of $50,000 to $100,000 for spectrum expansion RD&D projects (such as infrared broadcasting and low power millimeter wave broadcasting) by individual inventors and/or small enterprises**

***And***

**(B) Suspension of the FCC's "interim" approval of In Band On Channel (IBOC) Digital Radio technology, pending a competitive comparison with alternative technologies that require less allocation of spectrum**

**Respectfully submitted,**

**Don Schellhardt, Esquire**
**pioneerpath@earthlink.net or pioneerpath@hotmail.com**
**45 Bracewood Road**
**Waterbury, Connecticut 06706**
**203/757-1790**
**"Backup": 203/756-7310**

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